



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,784	03/10/2004	Anant Achyut Setlur	GLOZ 2 00169 (RD29342)	4139
27885	7590	06/30/2005	EXAMINER	
FAY, SHARPE, FAGAN, MINNICH & MCKEE, LLP 1100 SUPERIOR AVENUE, SEVENTH FLOOR CLEVELAND, OH 44114			MONDT, JOHANNES P	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

5

<b>Office Action Summary</b>	Application No. 10/797,784	Applicant(s) SETLUR ET AL.	
	Examiner Johannes P. Mondt	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/10/04</u> . | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This office action is in response to the filing of the Application on 3/10/2004.

#### ***Information Disclosure Statement***

The examiner has considered the items listed in the Information Disclosure Statement. A signed copy of Form PTO-1449 is enclosed with the office action.

#### ***Specification***

The Specification is objected to because the definitions of the chemical composition of the phosphors are inadequately defined. In particular, the expression (X,Y,Z) for specific chemical elements X,Y,Z, such as in (Sr,Ba,Ca)SiO<sub>4</sub>:Eu (see for instance, page 3, line 15, but also similar expressions throughout the Specification on page 3, lines 24-31, page 8, line 29, page 10, line 29, 31 and 32, page 11, second paragraph and from line 11 on, page 12, up to line 27) fails to particularly define the stoichiometry, in contrast, for instance with the precise definition provided by Juestel et al in WO 03/080763 A1, see for instance the abstract. While both (Sr,Ba,Ca)SiO<sub>4</sub>:Eu and (Sr,Ba,Ca)<sub>2</sub>SiO<sub>4</sub>:Eu appear in the text it is not understood if a true difference is implied, considering the absence in any case of any stoichiometric parametrization. In case it is much explanation should have been provided in light of the known valence of the SiO<sub>4</sub> ion. In addressing the deficiency noted here Applicants should be careful not to introduce new matter.

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. ***Claims 1-43*** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the chemical composition indicated by the notation (Ba,Ca,Sr)SiO<sub>4</sub>:Eu is indefinite because the stoichiometric ratios, whether characterizing the relative concentrations of the alkaline earths or the relative concentrations of the group of alkaline earths relative to the orthosilicate ions are not defined. A distinction appears to be made between (Ba,Ca,Sr)SiO<sub>4</sub>:Eu and (Ba,Ca,Sr)<sub>2</sub>SiO<sub>4</sub>:Eu judging from the Specification. However, it is difficult to see how the definite valence of 4 of the orthosilicate ion SiO<sub>4</sub> is compatible with any chemical constitution other than one in which the total number of alkaline earth atoms in the molecule equals 2.
3. ***Claims 1-43*** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the wording "at from" is internally contradictory and hence indefinite because at implies a fixed value "while from ... to" implies a range.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. ***Claims 1-3, 6, 7, 8, 12 and 13*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Juestel et al (WO 03/080763 A1) in view of Sugawara et al (JP 11-261105). *The following rejection is made according to examiner's best understanding notwithstanding the indefinite nature of the claim language as noted overhead.* The examiner will assume that the expression "(Sr,Ba<Ca)SiO<sub>4</sub>" corresponds to the disclosed expression "(Sr,Ba,Ca)<sub>2</sub>SiO<sub>4</sub>:Eu" while the notation (Sr,Ba,Ca) therein is assumed to denote "Sr<sub>1-x-y-z</sub>Ba<sub>x</sub>Ca<sub>y</sub>", wherein z denotes the substitution by Eu. Furthermore, regarding the equally indefinite language "at from about 250 nm to about 500 nm" the examiner here assumes that "at from" means "in a range from".

*Juestel et al teach a lighting apparatus for emitting white light (see Abstract) comprising: a semiconductor light source emitting radiation at a wavelength from about 450 nm to about 480 nm (page 6, lines 6-13); and a phosphor composition radiationally coupled to the semiconductor light source, the phosphor composition comprising (Ba, Sr, Ca) SiO<sub>4</sub>: Eu, namely: (Ba<sub>1-x-y-z</sub>Sr<sub>x</sub>Ca<sub>y</sub>)<sub>2</sub>SiO<sub>4</sub>:Eu<sub>z</sub> (see Abstract). Although the wavelength of the radiation emitted by the semiconductor light source is in the range claimed and hence a case of *prima facie* obviousness exists, it would have been obvious to include the same InAlGa<sub>N</sub> light-emitting layer as in the application rather*

Art Unit: 2826

than the InGaN light-emitting layer by Juestel et al in view of Sugawara, who teach an LED with an InAlGaN layer (thus meeting the further limitation of claim 3) for its wide spectral range and a durability superior to an InGaN light-emitting layer (see [0007]-[0010]). *Motivation* to include the teaching by Sugawara et al in the invention by Juestel et al at least immediately derives from the longer life span of the LED as taught by Sugawara et al (see [0007]-[0010]).

*On claim 2:* The light source by Juestel et al is an LED (see abstract).

*On claim 6:* the lighting apparatus by Juestel et al further comprises an encapsulant (resin 3: page 10, lines 8-15) surrounding the light source and the phosphor composition (Figure 2 and page 7, lines 19-22).

*On claim 7:* the phosphor composition is dispersed in the encapsulant (Figure 2 and page 7, lines 19-22).

*On claim 8:* the lighting apparatus by Juestel et al further comprises a reflector cup 2 (page 10, 8-15).

*On claim 12:* said phosphor composition by Juestel et al further comprises one or more additional phosphors, namely: any of the other phosphors listed in the group on page 4, lines 20-25, or the red phosphor selected from the group listed on page 7, lines 15-18.

*On claim 13:* said one or more additional phosphors are selected from the group consisting of the elements listed in this claim, as witnessed by the presence of  $(\text{Sr}_{1-x-y}\text{Ba}_x\text{Ca}_y)_2\text{Si}_5\text{N}_8:\text{Eu}$ , i.e.,  $(\text{Ba},\text{Sr},\text{Ca})_2\text{Si}_y\text{N}_z:\text{Eu}^{2+}$ .

3. **Claims 14-16, 19-21 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Juestel et al in view of Sugawara et al (JP 11-261105), Shiiki et al (US 2003/0155856 A1) and Lowden et al (US 2002/0174794 A1).

*The following rejection is made according to examiner's best understanding notwithstanding the indefinite nature of the claim language as noted overhead.* The examiner will assume that the expression "(Sr,Ba<Ca)SiO<sub>4</sub>" corresponds to the disclosed expression "(Sr,Ba,Ca)<sub>2</sub>SiO<sub>4</sub>:Eu" while the notation (Sr,Ba,Ca) therein is assumed to denote "Sr<sub>1-x-y-z</sub>Ba<sub>x</sub>Ca<sub>y</sub>", wherein z denotes the substitution by Eu. Furthermore, regarding the equally indefinite language "at from about 250 nm to about 500 nm" the examiner here assumes that "at from" means "in a range from".

*Juestel et al teach* a UV light source emitting radiation (any InGaN LED radiates in the UV range because the band gap only sets a lower limit to the frequency) (page 7, lines 19-20) while the range of UV substantially overlaps with the claimed range, and hence at least *prima facie* obviousness can be concluded on the range of the primary light, while furthermore, it would have been

it would have been obvious to include the same InAlGaN light-emitting layer as in the application rather than the InGaN light-emitting layer by Juestel et al in view of Sugawara, who teach an LED with an InAlGaN layer (thus meeting the further limitation of claim 16) for its wide spectral range and a durability superior to an InGaN light-emitting layer (see [0007]-[0010]). *Motivation* to include the teaching by Sugawara et al in the invention by Juestel et al at least immediately derives from the longer life span of the LED as taught by Sugawara et al (see [0007]-[0010]); the lighting apparatus by

Art Unit: 2826

Juestel further comprises a phosphor composition radiationally coupled to the light source (see Abstract), the phosphor composition comprising  $(\text{Ba}, \text{Sr}, \text{Ca})\text{SiO}_4:\text{Ce}$  (see Abstract), one or more garnet phosphor having the general formula:  $(\text{Y}, \text{Gd}, \text{La}, \text{Lu}, \text{T}, \text{Pr}, \text{Sm})_3(\text{Al}, \text{Ga}, \text{In})_5\text{O}_{12}:\text{Ce}$ , namely:  $\text{Y}_{1-x}\text{Gd}_x\text{Al}_{1-y}\text{Ga}_y\text{O}_{12}:\text{Ce}$  (page 7, lines 15-18). *Juestel et al* do not necessarily teach the inclusion magnesium fluorogermanate. However, as evidenced by *Shiiki et al*, magnesium fluorogermanates have long been recognized as additional red phosphors (see [0016]) in the art of light emitting diodes for producing white light, while as witnessed for instance by Lowden et al, the selection of the specific magnesium fluorogermanate having the specific formula  $\text{Mg}_4\text{FGeO}_6:\text{Mn}$  has long been used as red phosphor.

*On claim 15:* the light source by Juestel et al is a semiconductor LED.

*On claim 19:* the lighting apparatus by Juestel et al further comprises an encapsulant (resin 3: page 10, lines 8-15) surrounding the light source and the phosphor composition (Figure 2 and page 7, lines 19-22).

*On claim 20:* the phosphor composition is dispersed in the encapsulant (Figure 2 and page 7, lines 19-22).

*On claim 21:* the lighting apparatus by Juestel et al further comprises a reflector cup 2 (page 10, 8-15).

*On claim 26:* said one or more additional phosphors are selected from the group consisting of the elements listed in this claim, as witnessed by the presence of  $(\text{Sr}_{1-x-y}\text{Ba}_x\text{Ca}_y)_2\text{Si}_5\text{N}_8:\text{Eu}$ , i.e.,  $(\text{Ba}, \text{Sr}, \text{Ca})_2\text{Si}_5\text{N}_8:\text{Eu}^{2+}$ .

Art Unit: 2826

4. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over Juestel et al, Sugawara et al, Shiiki et al and Lowden as applied to claim 14 above, and further in view of Duggal et al (6,515,417 B1), or, in the alternative, further in view of Admitted Prior Art by Applicant. As detailed above, claim 14 is unpatentable over Juestel et al in view of Sugawara et al, Shiiki et al and Lowden, none necessarily teaching the further limitation defined by claim 17. However, it would have been obvious to include said further limitation in view of Duggal et al, who teach an organic light emitting diode emitting in the range claimed (col. 5, l. 25-47), or, in the alternative, in view of Applicants' admission of prior art of an organic light emitting diode (pages 5-6) suitable for the structure of the invention. *Motivation* to replace the semiconductor light-emitting source of Juestel et al by the organic light emitting diode by Duggal et al at least derives from the lower cost of organic light emitting diodes.

5. **Claims 1-3** are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al (6,621,211 B1) in view of Sugawara et al (JP 11-261105).

*The following rejection is made according to examiner's best understanding notwithstanding the indefinite nature of the claim language as noted overhead.* The examiner will assume that the expression "(Sr,Ba<Ca)SiO<sub>4</sub>" corresponds to the disclosed expression "(Sr,Ba,Ca)<sub>2</sub>SiO<sub>4</sub>:Eu" while the notation (Sr,Ba,Ca) therein is assumed to denote "Sr<sub>1-x-y</sub>-zBa<sub>x</sub>Ca<sub>y</sub>", wherein z denotes the substitution by Eu. Furthermore, regarding the equally indefinite language "at from about 250 nm to about 500 nm" the examiner here assumes that "at from" means "in a range from".

*Srivastava et al* teach a lighting apparatus for emitting white light comprising: a semiconductor light source (emitting radiation in a range either defined by an upper limit equal to 420 nm or by a range from 420 to 650 nm, while *Srivastava et al* also teach a InGaN LED (thus meeting claim 2) emitting between 360 and 420 nm (col. 6, l. 10-12), ranges substantially overlapping the range as claimed; a phosphor composition radiationally coupled to the light source (see Abstract), the phosphor composition comprising (Ba,Sr,Ca) SiO<sub>4</sub>:Eu (see Abstract). While the overlapping ranges for the primary emission of the light source constitute at least a case of prima facie obviousness, it would have been obvious to include the same InAlGaN light-emitting layer as in the application rather than the InGaN light-emitting layer by *Srivastava et al* in view of *Sugawara*, who teach an LED with an InAlGaN layer (thus meeting the further limitation of claim 3) for its wide spectral range and a durability superior to an InGaN light-emitting layer (see [0007]-[0010]). *Motivation* to include the teaching by *Sugawara et al* in the invention by *Juestel et al* at least immediately derives from the longer life span of the LED as taught by *Sugawara et al* (see [0007]-[0010]).

6. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over *Juestel et al* in view of *Sugawara et al* as applied to claim 1 above, and further in view of *Duggal et al* (6,515,417 B1), or, in the alternative, further in view of Admitted Prior Art by Applicant. As detailed above, claim 1 is unpatentable over *Juestel et al* in view of *Sugawara et al*, neither necessarily teaching the further limitation defined by claim 4. However, it would have been obvious to include said further limitation in view of *Duggal et al*, who teach an organic light emitting diode emitting in the range claimed (col. 5, l.

Art Unit: 2826

25-47), or, in the alternative, in view of Applicants' admission of prior art of an organic light emitting diode (pages 5-6) suitable for the structure of the invention. *Motivation* to replace the semiconductor light-emitting source of Juestel et al by the organic light emitting diode by Duggal et al at least derives from the lower cost of organic light emitting diodes.

7. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Juestel et al and Sugawara et al as applied to claim 1 above, and further in view of Reeh et al (US 2001/0000622 A1). As detailed above, claim 1 is unpatentable over Juestel et al in view of Sugawara et al, neither necessarily teaching the further limitation defined by claim 5. However, it would have been obvious to include said further limitation because, as shown by Reeh et al, the importance for the exact hue on uniform photon path length has long been recognized (see paragraph [090]), which is achieved inter alia by the embodiment of Figure 6 in Reeh et al, in which the phosphor composition is coated on the surface of the light source (see [0102]). *Motivation* to include the teaching by Reeh et al immediately flows from the aim by Juestel et al to improve the quality of color rendering.

8. **Claim 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over Juestel et al and Sugawara et al as applied to claim 14 above, and further in view of Reeh et al (US 2001/0000622 A1). As detailed above, claim 14 is unpatentable over Juestel et al in view of Sugawara et al, Shiiki et al and Lowden et al, none necessarily teaching the further limitation defined by claim 18. However, it would have been obvious to include

Art Unit: 2826

said further limitation because, as shown by Reeh et al, the importance for the exact hue on uniform photon path length has long been recognized (see paragraph [090]), which is achieved inter alia by the embodiment of Figure 6 in Reeh et al, in which the phosphor composition is coated on the surface of the light source (see [0102]).

*Motivation* to include the teaching by Reeh et al immediately flows from the aim by Juestel et al to improve the quality of color rendering.

9. **Claims 27, 28, 38 and 39** are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al (6,621,211 B1) in view of Sugawara et al (JP 11-261105).

*The following rejection is made according to examiner's best understanding notwithstanding the indefinite nature of the claim language as noted overhead.* The examiner will assume that the expression "(Sr,Ba<Ca)SiO<sub>4</sub>" corresponds to the disclosed expression "(Sr,Ba,Ca)<sub>2</sub>SiO<sub>4</sub>:Eu" while the notation (Sr,Ba,Ca) therein is assumed to denote "Sr<sub>1-x-y-z</sub>Ba<sub>x</sub>Ca<sub>y</sub>", wherein z denotes the substitution by Eu. Furthermore, regarding the equally indefinite language "at from about 250 nm to about 500 nm" the examiner here assumes that "at from" means "in a range from".

*Srivastava et al teach* a lighting apparatus for emitting white light comprising: a semiconductor light source (emitting radiation in a range either defined by an upper limit equal to 420 nm or by a range from 420 to 650 nm, while Srivastava et al also teach a InGaN LED (thus meeting claim 28) emitting between 360 and 420 nm (col. 6, l. 10-12), ranges substantially overlapping the range as claimed; a phosphor composition

Art Unit: 2826

radiationally coupled to the light source (see Abstract), the phosphor composition comprising (Ba,Sr,Ca) SiO<sub>4</sub>:Eu (see Abstract) and (Sr,Mg,Ca,Ba,Zn)2P<sub>2</sub>O<sub>7</sub>:Eu,Mn (see Abstract) as well as (Ca,Sr,Ba,Mg)<sub>5</sub>(PO<sub>4</sub>)<sub>3</sub>Cl:Eu,Mn (see Abstract), thus meeting the claim limitation on phosphor composition. While the overlapping ranges for the primary emission of the light source constitute at least a case of prima facie obviousness, it would have been obvious to include the same InAlGa<sub>N</sub> light-emitting layer as in the application rather than the InGa<sub>N</sub> light-emitting layer by Srivastava et al in view of Sugawara, who teach an LED with an InAlGa<sub>N</sub> layer (thus meeting the further limitation of claim 29) for its wide spectral range and a durability superior to an InGa<sub>N</sub> light-emitting layer (see [0007]-[0010]). *Motivation* to include the teaching by Sugawara et al in the invention by Juestel et al at least immediately derives from the longer life span of the LED as taught by Sugawara et al (see [0007]-[0010]).

*On claims 38-39:* said phosphor composition in the lighting apparatus by Srivastava et al further comprises one or more additional phosphors, in particular BaMgAl<sub>10</sub>O<sub>17</sub>:Eu<sup>2+</sup> (BAM) which is a special case of the listed BaMgAl<sub>10</sub>O<sub>17</sub>:Eu, Mn ("BAM, BAMn").

10. **Claims 32-34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al and Sugawara et al as applied to claim 27 above, and further in view of Juestel et al (WO 03/080763 A1). As detailed above, claim 27 is unpatentable over Srivastava et al in view of Sugawara et al, neither necessarily teaching the further limitations defined by claims 32-34. However, it would have been obvious to include

Art Unit: 2826

said further limitations in view of Juestel et al, who teach the application to a blue/UV LED source encapsulated with a blend of phosphors by resin 3 (page 10), said resin 3 serving as encapsulant surrounding the light source and the phosphor composition (see Figure 1; thus meeting claim 32) said resin serving as an encapsulant within which the phosphors are dispersed ( thus meeting claim 33), such that all primary light impinges on said phosphor blend while at the same time the resin provides protection for the LED source; while a reflector cup reflects back any light otherwise escaping from contributing to the interaction with the phosphor composition (thus meeting claim 34). Motivation to include the teaching by Juestel derives from the obvious advantage to apply the invention by Srivastava et al to an LED wherein the primary light source is protected while at the same time the primary light from the blue./UV LED source must travel through the phosphor by virtue of the LED being surrounded by the phosphor composition and reflectors further re-directing light back into the phosphor composition; thus improving the efficiency of the white light LED.

11. **Claim 30** is rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al and Sugawara et al as applied to claim 27 above, and further in view of Duggal et al (6,515,417 B1), or, in the alternative, further in view of Admitted Prior Art by Applicant. As detailed above, claim 27 is unpatentable over Srivastava et al in view of Sugawara et al, neither necessarily teaching the further limitation defined by claim 30.

However, it would have been obvious to include said further limitation in view of Duggal et al, who teach an organic light emitting diode emitting in the range claimed (col. 5, l. 25-47), or, in the alternative, in view of Applicants' admission of prior art of an organic light emitting diode (pages 5-6) suitable for the structure of the invention. *Motivation* to replace the semiconductor light-emitting source of Juestel et al by the organic light emitting diode by Duggal et al at least derives from the lower cost of organic light emitting diodes.

12. **Claim 31** is rejected under 35 U.S.C. 103(a) as being unpatentable over Shirvastava et al and Sugawara et al as applied to claim 27 above, and further in view of Reeh et al (US 2001/0000622 A1). As detailed above, claim 27 is unpatentable over Srivastava et al in view of Sugawara et al, neither necessarily teaching the further limitation defined by claim 31. However, it would have been obvious to include said further limitation because, as shown by Reeh et al, the importance for the exact hue on uniform photon path length has long been recognized (see paragraph [090]), which is achieved inter alia by the embodiment of Figure 6 in Reeh et al, in which the phosphor composition is coated on the surface of the light source (see [0102]). *Motivation* to include the teaching by Reeh et al immediately flows from the aim by Srivastava et al et al to improve the quality of color rendering.

13. **Claims 40 and 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over Juestel et al (WO 03/080763 A1) in view of Emerson et al (US 2003/0209705 A1)

Art Unit: 2826

and Nose et al (6,243,151). Juestel et al teach a phosphor blend including  $(\text{Sr}, \text{Ba}, \text{Ca})_2\text{SiO}_4:\text{Eu}$  and  $(\text{Y}_{1-x}\text{Gd}_x)_3(\text{Al}_{1-y}\text{Ga}_y)_5\text{O}_{12}:\text{Ce}$  (page 7, 13-18). Given the blue light-emitting source the above green and red phosphors are adequate and therefore Juestel et al has no need to teach the blue phosphor also included in claim 40.

However, ultraviolet light-emitting devices have the advantage, as expressed by Emerson et al, that the blue component may otherwise be overrepresented (see paragraphs [0008] and [0009]). Therefore, it would have been obvious to replace the LED dominant in blue in Juestel et al (although also emitting in the UV spectrum) by a UV LED. Then, however, a third, blue, phosphor must be included in the blend so as to select and tailor the outcoming light. The list of phosphors as claimed includes well known blue phosphors in the art, such as the blue phosphor  $\text{SrP}_2\text{O}_7:\text{Eu}$ , which is a special case of  $(\text{Sr}, \text{Mg}, \text{Ca}, \text{Ba}, \text{Zn})_2\text{P}_2\text{O}_7:\text{Eu}, \text{Mn}$ , used by Nose et al (col. 9, l. 12-24, Figure 4). Motivation to include the teachings by Emerson et al and Nose et al in the invention by Juestel et al derives from the preventing of an overrepresentation of blue in the outcoming light and the creation of another parameter with which the composition of the outcoming light may be fine-tuned, namely; the relative abundance of the blue phosphor in the blend. With regard to *claim 43*: the existence green, red and blue phosphors in the blend enable the production of white light.

**Conclusion**

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Austria Patent AT 410 266 B (Assignee: Tridonic Optoelectronics GmbH), teaching as prior art at least claim 1.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM  
June 27, 2005

Patent Examiner:

  
Johannes Mondt (Art Unit: 2826)